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IS 9086 (2003): Aerospace - Universal Head Aluminium Alloy Rivets [TED 14: Aircraft and Space Vehicles]

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(पहला पुनरीक्षण)

Indian Standard

AEROSPACE — UNIVERSAL HEAD ALUMINIUM ALLOY RIVETS — SPECIFICATION

(First Revision)

ICS 49.030.60

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BUREAU OF INDIAN STANDARDS
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI 110002

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Price Group 4

Aircraft , Space Vehicles and Aircraft Electrical Equipment Sectional Committee, TED 14

FOREWORD

This Indian Standard (First Revision) was adopted by the Bureau of Indian Standards, after the draft finalized by the Aircraft, Space Vehicles and Aircraft Electrical Equipment Sectional Committee had been approved by the Transport Engineering Divisional Council.

This standard was first published in 1979 and was based on ISO/DIS 3230 'Aircraft aluminium alloy rivets — Basic dimensions, materials and identification symbols'. Subsequently ISO 3230 : 1998 'Aerospace — Rivets, solid, 100° normal countersunk head with dome, metallic material, with or without surface treatment — Dimensions' was published, whereas for universal head solid rivets a separate standard ISO 8280 : 1993 'Aerospace — Rivets, solid, universal head, metallic material, with or without surface treatment — Dimensions' was published. This standard has been accordingly revised to bring it in line with ISO 8280 : 1993. Another Indian Standard, namely, IS 9087 : 2000 'Aircraft — 100° countersunk aluminium alloy rivets' has been published in line with ISO 3230 : 1998.

The composition of the Committee responsible for the formulation of this standard is given in Annex A.

For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test or analysis, shall be rounded off in accordance with IS 2 : 1960 'Rules for rounding off numerical values (*revised*)'. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

Indian Standard

AEROSPACE — UNIVERSAL HEAD ALUMINIUM ALLOY RIVETS — SPECIFICATION

(First Revision)

1 SCOPE

This standard covers material, dimensions and requirements for universal head aluminium alloy rivets for use in aircraft.

2 REFERENCES

The following standards contain provisions which through reference in this text, constitute provision of this standard. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this standard are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below:

IS No.	*Title*
1868 : 1996	Anodic coatings on aluminium and its alloys (*third revision*)
8513 : 1977	Aluminium alloy wire for cold forged rivets for aircraft purposes (Alloy 55000)
8514 : 1977	Aluminium alloy wire for cold forged rivets for aircraft purposes (Alloy 24530)
8936 : 1978	Aluminium alloy for wire for cold forged rivets for aircraft purposes (Alloy 24350)
8937 : 1978	Aluminium alloy wire for cold forged rivets for aircraft purposes (Alloy 22500)
8938 : 1978	Aluminium alloy wire for cold forged rivets for aircraft purposes (Alloy 24345)
9089 : 1996	Aircraft — Aluminium and wrought aluminium rivets — General requirements (*first revision*)

3 MATERIALS

3.1 The rivets shall be made from any one of the five aluminium alloys specified in respective Indian Standards as follows:

Alloy No.	*IS No.*
1	8513
2	8937
3	8514
4	8936
5	8938

3.2 The condition of supply, heat treatment and mechanical properties of wire used for manufacture of rivets shall be as follows:

Alloy No.	*Condition as Delivered to Rivet Maker*	*Heat Treatment to be Given to Tensile Test Sample*	*Minimum Tensile Strength of Test Sample,* MPa	*Minimum Shear Strength,* MPa
1	Annealed	None	265	160
2	Annealed and cold-drawn to secure a reduction on cross-sectional area of not less than 20 percent and more than 40 percent	Solutionize at 495 ± 5°C, quench in water below 40°C and age for not less than 4 days at room temperature	290	185
3	do	Solutionize at 495 ± 5°C, quench in water below 40°C and age at room temperature for not less than 4 days	390	265
4	do	Solutionize at 510 ± 5°C, quench in water below 40°C and age at temperature of 75 ± 5°C for 24 h	355	245
5	do	Solutionize at 495 ± 5°C, quench in water below 40°C and age at room temperature for not less than 48 h	400	235

3.3 Heat Treatment of Rivets by Rivet Manufacturer

Alloy No.	*Heat Treatment of Rivets*	*Remarks*
1	None	—
2	Solution treated at a temperature of 495 ± 5°C and quenched in water at a temperature not exceeding 40°C. Age at room temperature for not less than 4 days	—
3	do	—
4	Solution treated at a temperature of 510 ± 5°C and quenched in water at a temperature not exceeding 40°C. Age at temperature 75 ± 5°C for 24 h	No refrigeration is necessary before riveting
5	Solution treated at a temperature of 495 ± 5°C and quenched in water at a temperature not exceeding 40°C. Age at room temperature for not less than 48 h	Rivets commence to age harden immediately when kept at atmospheric temperatures after quenching. Ageing may be delayed by storing the rivets at low temperatures after quenching and they may be expected to remain in a condition suitable for closing for a period depending on the storage temperature as shown below: *Temperature Storage* — *Maximum Period* –0 to –5°C — 45 h –5.6 to –20°C — 150 h

4 DIMENSIONS

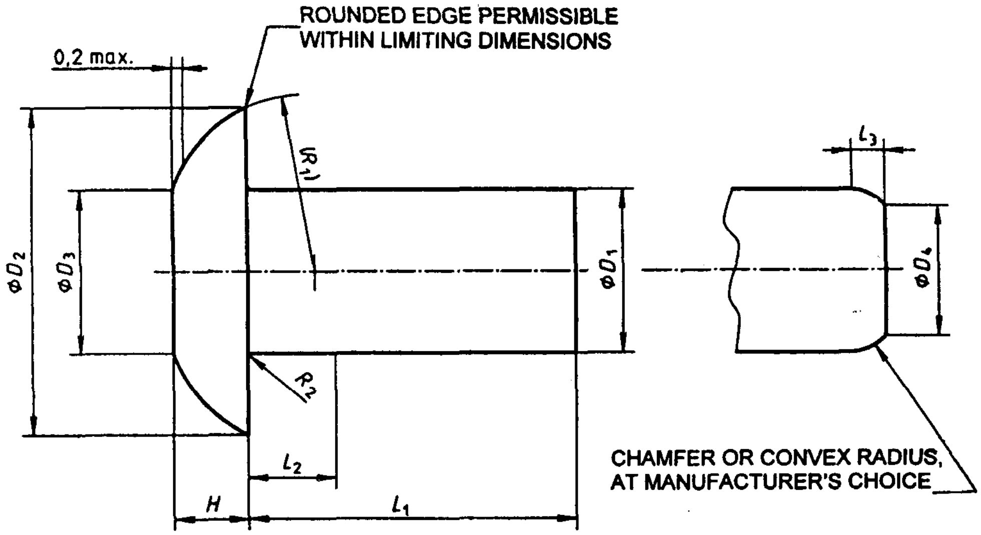
4.1 Dimensions and tolerances for diameter codes as recommended by ISO shall be as given in Table 1. These dimensions and tolerances are applicable after the surface treatment.

4.2 Length combination shall be as given in Table 2.

Table 1 Dimensions and Tolerances (ISO Codes)

(*Clause* 4.1)

All dimensions in millimetres unless otherwise specified.


0,2 max.
ROUNDED EDGE PERMISSIBLE WITHIN LIMITING DIMENSIONS
(R1)
ϕD2
ϕD3
ϕD1
R2
L2
H
L1
L3
ϕD4
CHAMFER OR CONVEX RADIUS, AT MANUFACTURER'S CHOICE

NON-RADIUSED TAIL END (TYPE A)

RADIUSED TAIL END (TYPE B)

Diameter Code	D_1 [1]	d_{11} [2] µm	D_2		D_3		D_4		H		L_2	L_3		R_1	R_2
			Max	*Min*	*Max*	*Min*	*Max*	*Min*	*Max*	*Min*		*Max*	*Min*		±0.08
016	1.6	–20 –80	3.36	3.04	1.6	1.2	–	–	0.9	0.7	1.4	–	–	2	0.15
020	2		4.2	3.8	2.0	1.5	–	–	1.1	0.9		–	–	2.4	
025	2.5		5.25	4.75	2.5	1.8	2.0	1.7	1.3	1.1		0.8	0.5	3	
030	3		6.3	5.7	3.0	2.2	2.4	2.1	1.5	1.3		0.9	0.6	3.7	
035	3.5	–30 –105	7.35	6.65	3.5	2.6	2.8	2.45	1.8	1.6	1.6	1.05	0.70	4.3	0.25
040	4		8.4	7.6	4	3	3.2	2.8	2.0	1.8		1.2	0.8	4.9	
050	5		10.5	9.5	5.0	3.7	4.0	3.5	2.4	2.2	2	1.5	1.0	6.1	
060	6		12.6	11.4	6.0	4.5	4.8	4.2	2.8	2.6		1.8	1.2	7.3	
080	8	–40 –130	16.8	15.2	8	6	6.4	5.6	3.7	3.5		2.4	1.6	9.8	
100	10		21	19	10.0	7.5	8	7	4.5	4.3		3	2	12.2	

[1] Over length L_2, D_1 maximum may increase by 0.03.

[2] Limit deviations for D_1.

Table 2 Length L_1 for Rivets in Aluminium and Aluminium Alloys

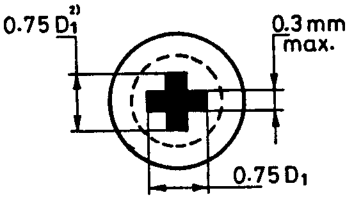
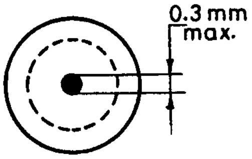
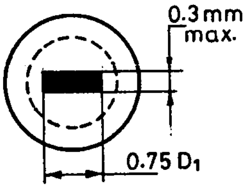
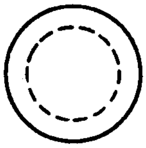
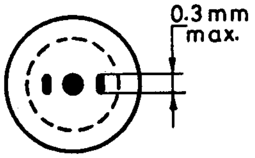
(*Clause* 4.2)

Length		Diameter Code																	
Code	L_1 +0.5 0	016	020	025		030		035		040		050		060		080		100	
		Type of Tail End[1]																	
		A	A	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B
003	3	+	+																
004	4	+	+	+	+	+	+	+	+										
005	5	+	+	+	+	+	+	+	+										
006	6	+	+	+	+	+	+	+	+	+	+								
007	7	+	+	+	+	+	+	+	+	+	+								
008	8	+	+	+	+	+	+	+	+	+	+	+	+						
009	9	+	+	+	+	+	+	+	+	+	+	+	+						
010	10	+	+	+	+	+	+	+	+	+	+	+	+	+	+				
011	11	+	+	+	+	+	+	+	+	+	+	+	+	+	+				
012	12	+	+	+	+	+	+	+	+	+	+	+	+	+	+				
013	13	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+		
014	14	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+		
015	15	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+		
016	16	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+		
017	17		+	+		+	+	+	+	+	+	+	+	+	+	+	+	+	+
018	18		+	+		+	+	+	+	+	+	+	+	+	+	+	+	+	+
019	19		+	+		+		+	+	+	+	+	+	+	+	+	+	+	+
020	20		+	+		+		+	+	+	+	+	+	+	+	+	+	+	+
022	22		+	+		+		+		+	+	+	+	+	+	+	+	+	+
024	24		+	+		+		+		+	+	+	+	+	+	+	+	+	+
026	26			+		+		+		+		+	+	+	+	+	+	+	+
028	28			+		+		+		+		+	+	+	+	+	+	+	+
030	30			+		+		+		+		+		+	+	+	+	+	+
032	32			+		+		+		+		+		+	+	+	+	+	+
035	35			+		+		+		+		+		+		+	+	+	+
040	40					+		+		+		+		+		+		+	
045	45							+		+		+		+		+		+	
050	50									+		+		+		+		+	
055	55											+		+		+		+	
060	60											+		+		+		+	

[1] *Type A*: non radiused tail end (*see* Fig. in Table 1).
Type B: radiused tail end (*see* Fig. in Table 1).

5 FINISH AND IDENTIFICATION SYMBOLS

The finish and identification symbols for the rivets are shown below. The rivets shall be marked on the head with the symbols. The symbols for alloys No. 1, 3 and 5 shall be embossed, having a height of approximately 0.3 mm. The indented point for alloy No. 2 shall have a depth of approximately 0.3 mm.

Alloy No.	*Finish*		*Identification Symbol*	
	Treatment	Colour		
1	Anodic	Green		Embossed
2	Anodic	Violet		Indented
3	Anodic	Blue		Embossed
4	Anodic	Grey		No Marking
5	Anodic	Plain		Embossed

NOTE — For anodic coating, *see* IS 1868.

6 GENERAL REQUIREMENTS

Unless specified otherwise, the general requirements for rivets shall conform to IS 9089.

7 DESIGNATION

Aluminium alloy rivets shall be designated by its name, rivet diameter, rivet length, alloy number and number of this standard.

Example:

A universal head rivet of diameter code 060 (6 mm), length 20 mm, made of alloy No. 3 and conforming to this standard shall be designated as:

Universal head rivet 060 × 20 – 3 – IS 9086.

8 INSPECTION

The inspection is by quality control methods designed to ensure that the manufacturing process is stable and that the rivets meet the requirement of the specification. For sampling and inspection plan, *see* Table 1 of IS 9089.

9 FREEDOM FROM DEFECTS

The rivets shall be free from harmful defects. The rivets may be rejected for faults in, or revealed in manufacture, although they have been made from material passed previously for chemical composition and mechanical properties.

10 MARKING

10.1 Packages shall be legibly and indelibly marked with the following:

a) Manufacturer's name or trade-mark, if any;
b) Rivet designation;
c) Quantity;
d) Month/year of manufacture; and
e) Inspector's stamp.

10.2 Rivets may also be marked with the Standard Mark.

10.2.1 The use of the Standard Mark is governed by the provisions of the *Bureau of Indian Standards Act*, 1986 and the Rules and Regulations made thereunder. The details of conditions under which the licence of the use of the Standard Mark may be granted to manufacturers or producers may be obtained from the Bureau of Indian Standards.

11 PACKING

11.1 The rivets shall be packed as agreed to between the purchaser and the supplier. Each unit of packing shall contain rivets of only one form, size manufactured from one batch of material and as far as possible inspected together.

11.2 The packing shall be capable of protecting the rivets from damage during transit and storage by usual means.

ANNEX A

(Foreword)

COMMITTEE COMPOSITION

Aircraft, Space Vehicles and Aircraft Electrical Equipment Sectional Committee, TED 14

Organization	*Representative(s)*
Directorate General of Aeronautical Quality Assurance (DGAQA), New Delhi	Shri M. V. Sundaram (***Chairman***) Shri R. N. Sharma (*Alternate*)
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(*Continued on page* 8)

(*Continued from page* 7)

Accessories, Fasteners and Other Structural Items for Aircraft and Space Vehicles Subcommittee, TED 14:2

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